

REMARKS

The abstract and specification have been amended in order to correct grammatical and idiomatic errors contained therein and to place the abstract in correct form. No new matter has been added. The undersigned hereby certifies, to the best of his knowledge and belief, that no new matter has been added.

In order to expedite the prosecution of the present application, Claims 1-6 have been canceled and replaced by newly presented Claims 36-41. Newly presented Claims 36-41 require that a first part of the interconnectors have a density that is not less than 90% the theoretical density of the interconnector material or that would have a density of not less than 90% of the theoretical density of the interconnector material after sintering in contact with the respective fuel electrodes and the respective electrolytes and that the respective first parts of the respective interconnectors be connected to respective air electrodes via respective second parts of the interconnectors which may have a density less than the respective first parts. Support for this language is found at specification page 28, last full paragraph through the first paragraph on specification page 29. No new matter has been added. It is respectfully submitted that the amendments to the claims have cured all formal defects and that the rejections under 35 USC 112 have been overcome.

Claims 1-6, 13 and 33 have been rejected under 35 USC 103(a) as being unpatentable over Sato in view of Tsukuda. Claims 7 and 8 have been rejected under 35 USC 103(a) as being unpatentable over Sato in view of Tsukuda and further in view of Akiyama. Claims 9-11 and 14-18 have been rejected under 35 USC 103(a) as being unpatentable over Sato in view of Tsukuda and Akiyama and further in view of Xue and Bates. Claims 19-27 and 29-32 have been rejected under 35 USC 103(a) as being unpatentable over Sato in view of Tsukuda and further in view of Bates and Barker. Claims 28, 34 and 35 have been

rejected under 35 USC 103(a) as being unpatentable over Sato in view of Tsukuda, Bates, Barker and further in view of Xue. Applicants respectfully traverse these grounds of rejection and urge reconsideration in light of the following comments.

The presently claimed invention is directed to a method of manufacturing a solid oxide fuel cell module made up of a plurality of cells provided adjacent to one another and electrically connected in series by an interconnector provided therebetween. Each cell is made up of a fuel electrode, an electrolyte and an air electrode sequentially formed on a surface of a substrate having an internal fuel flowpath provided therein. At least the surface of the substrate in contact with the cells and interconnectors is electrically insulating. In the present invention, a first part of the interconnectors have a density that is not less than 90% of the theoretical density of the interconnector material or will have a density of not less than 90% of the theoretical density of the interconnector material after sintering in contact with the respective fuel electrodes and the respective electrolytes. As discussed in the present specification, through the use of the dense material in the first part of the interconnector coming into contact with the fuel electrode and the electrolyte, the gas-sealing performance is enhanced to thereby prevent gas from leaking between the interconnector and the respective electrolytes and secure electrical contact is achieved. The present invention also provides that a second part of the interconnector can have a density less than that of the first part. This enables the advantageous affect that the fabrication of the interconnectors can be implemented concurrently with the formation of the air electrodes or at a temperature lower than the sintering temperature of the air electrodes. Newly presented Claims 42-47 specifically require that the density of the second parts of the interconnectors be less than the density of the first parts. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

The Sato et al reference discloses a solid oxide fuel cell which comprises a hollow dense substrate having a plurality of mounting holes formed on the surface thereof, cell sections mounted in the mounting holes and interconnections between adjacent cell sections. This reference discloses that the interconnections 7 can be a material having an electrical conduction and that is stable in both an oxidizing atmosphere and a reducing atmosphere. There is no disclosure in this reference regarding the density of the interconnectors. As such, the secondary references cited by the Examiner must provide the motivation to one of ordinary skill in the art to modify this reference in a manner that would yield the presently claimed invention. It is respectfully submitted that the secondary references contain no such disclosure.

The Tsukuda et al reference discloses a fuel cell comprising a fuel electrode and an air electrode disposed on side surfaces of an electrolytic film. Interconnectors 15 are provided on the fuel cell disclosed in Tsukuda et al but there is no disclosure in this reference regarding the density of the interconnectors. Therefore, this reference adds nothing to the previously discussed references.


Akiyama, Xue, Bates and Barker have been cited by the Examiner as disclosing various aspects of the invention. However, none of these secondary references speak to providing an interconnector comprising a first part having the claimed density and a second part having a density that can be different from the first part. Therefore, these references do not cure the deficiencies of Tsukuda et al and Sato et al and therefore do not present a showing of prima facie obviousness under 35 USC 103(a) with respect to the presently claimed invention.

Although the prior art cited by the Examiner does not make a showing of prima facie obviousness under 35 USC 103(a), objective test data is of record in the present application which more than supports the patentability of the presently

claimed invention. That is, in working Example 3 in the present specification, silver powder and glass powder were mixed at various ratios in order to form interconnectors. Measurements were made on the gas-sealing performance and electrical conductivity of the interconnectors that were fabricated. As shown in Table 1, the interconnectors made according to the present invention had satisfactory sealing performance and electrical conductivity. This is completely unexpected in light of the prior art cited by the Examiner and further establishes the patentability of the claimed invention thereover.

Reconsideration of the present application and the passing of it to issue is respectfully solicited.

Respectfully submitted,


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Encl: Replacement Abstract
Clean Substitute Specification
Marked-Up Substitute Specification
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136.07/05